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JOINT PHOTOGRAPHIC INTELLIGENCE REPORT

LAUNCH AREA "A"
A REANALYSIS OF THE LAUNCHING STRUCTURE
MISSILE LAUNCHING COMPLEX,
TYURA TAM, USSR

PIC/JR-2/61

March 1961

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PREFACE

This joint photographic intelligence report has been prepared by the Army, Navy, and Central Intelligence Agency in response to CIA Requirement SI/R78/60. It presents the results of a reanalysis of TALENT photography of the launching structure, with emphasis on the servicing tower, at Launch Area "A", Tyura Tam Missile Launching Complex. This report supersedes those portions of PIC/JR-2/60 1/ which deal with the servicing tower and the launching structure.

In the preparation of this report a number of improved techniques were used to arrive at a more definitive interpretation of significant features. Minicard Film, with a high image definition and wide tonal range, was used on all photography. In addition, a model of the launching structure was constructed and a number of model towers made in order to duplicate shadows appearing on TALENT photography.

While horizontal measurements appearing in this report may be considered accurate, vertical measurements can be considered only approximate, with accuracy varying from All vertical measurements included herein are based on shadow analysis, with varying accuracy dependent on the definition of shadow images and ground clutter within shadows. Because of the lack of image resolution on critical features, vertical measurements taken with the Nistri Stereocomparator and similar instruments proved less accurate.

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INTRODUCTION

Launch Area "A" was covered by usable photography on [REDACTED] [REDACTED] While the quality of photography was generally good, the relatively small scale and lack of resolution of the 1957 photography and the time of day of the 1959 photography (about 0615 local time) made interpretation of minute detail extremely difficult. The two previous reports covering the Tyura Tam Missile Launching Complex (PIC/JR-2/60 1/ and HTA/JR-4/58 2/) dealt comprehensively with activities throughout the complex. Consequently, expanded treatment of the structural details on the launching structure itself was not undertaken. Continued interest in the intelligence community in the capabilities and limitations of the launching structure and the servicing tower in particular have necessitated this expanded treatment of these two items. To illustrate the structural details of the servicing tower as clearly as possible, both a line drawing (Figure 1) and a perspective (Figure 2) are included. Figure 1 supersedes corresponding portions of Figure 6 of JR-2/60. Dashed lines indicate probable locations of items not visible on photography. For clarity, fences are omitted from the front view.

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DETAILS OF THE REANALYSIS

Most of the mensural data and configuration analysis of the launching structure presented in JR-2/60 remains unchanged, although the interpretation of some features has been revised through the use of improved photographic materials.

Launching Structure

Interpretation of the structure remains unchanged, with two exceptions. The dark circular area beneath the servicing tower, previously measured as 65 feet in diameter, has been re-examined. Through the use of im-

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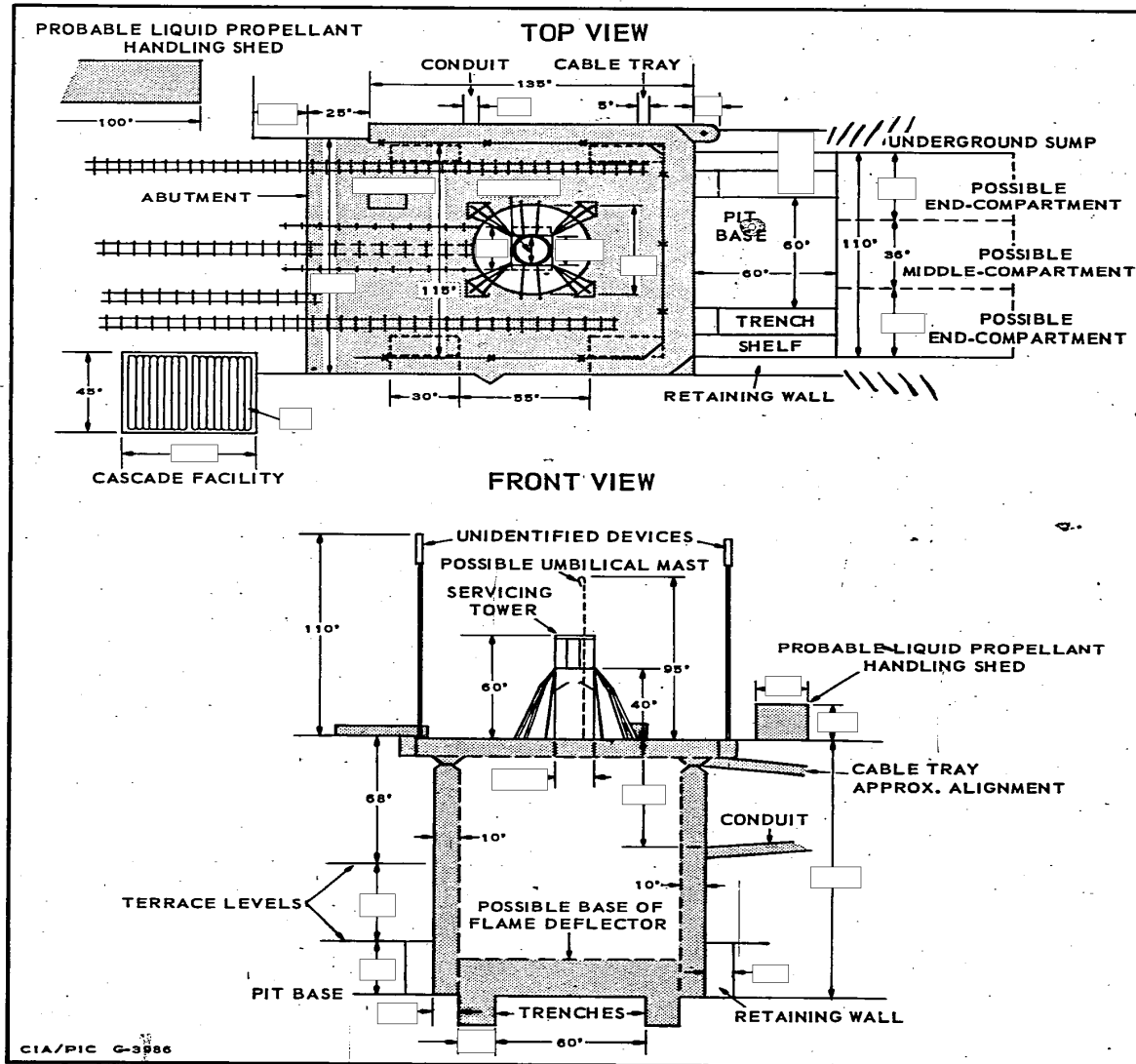


FIGURE 1. PLAN VIEW AND FRONT ELEVATION OF LAUNCHING STRUCTURE AT LAUNCH AREA "A".

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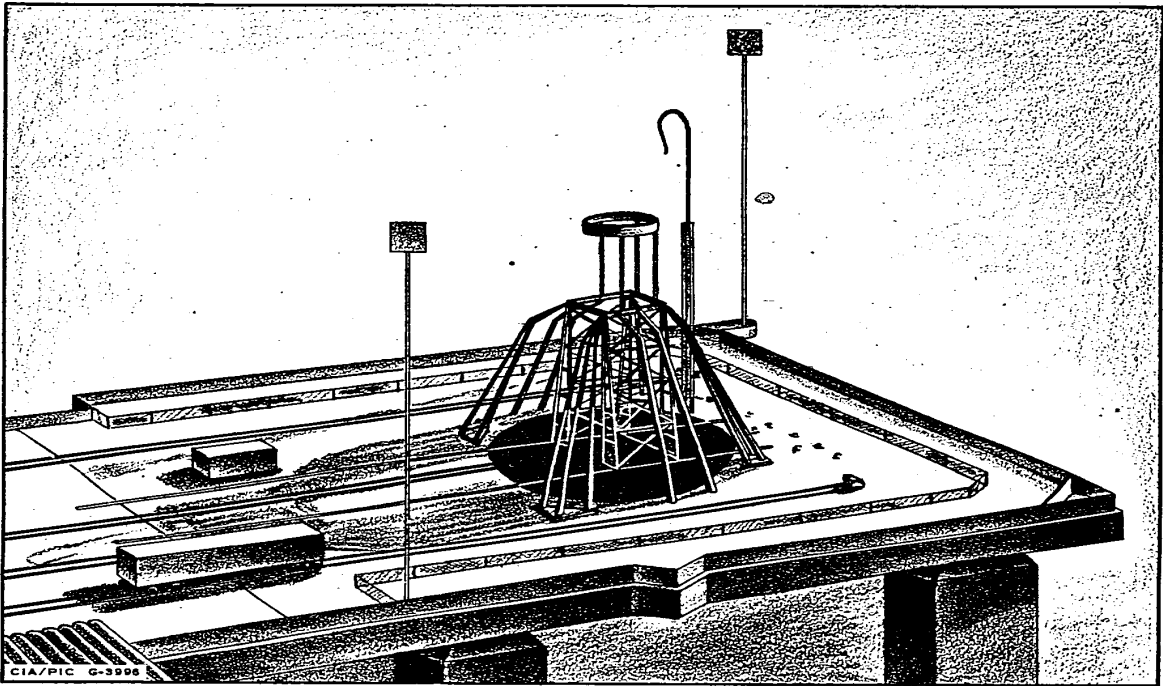


FIGURE 2. CONCEPT OF SERVICING TOWER AT LAUNCH AREA "A". This illustration shows many features newly identified since PIC/JR-2/60, February 1960.

proved photographic materials it has been determined that the area consists of a circular hole about [] in diameter. The hole has a semi-opaque appearance on the photography, suggesting that it may have a grating of some sort over it. In addition, although there is no photographic evidence, there are probably a number of supporting members within the hole sufficient to support the [] gantry tracks beneath the servicing tower, the standard-gauge rail line which passes between the gantry tracks, and a launching table or similar device, if the missile is to be fired from the top of the launching platform.

It was reported in JR-2/60 that the four concrete pillars supporting the launching platform were 30 feet wide, but that their thickness could

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not be determined. Analysis of new photographic materials reveals that at least one, and probably both, of the two front (east) pillars may be only about 10 feet thick. The base of the pillar on the northeast corner of the launching structure is visible on newer photographic material and its south side, while poorly defined, appears to nearly coincide with the north side of the northernmost of the two trenches which connect the launching structure and the underground sump within the pit. However, it should be noted that the corresponding pillars at Launch Area "B", under construction in July 1959, were square and measured about 25 feet on a side.

Launching Platform

In the re-evaluation of facilities on the launching platform, the interpretation of a number of minor features has been revised. It was reported in JR-2/60 that the rail spur which extended onto the north side of the launching platform in 1957 had been removed before the 1959 photography. Better quality photographic materials reveal that the spur had not been removed, but had, in fact, been extended 10 feet farther east. A small building, [] has been identified on the west side of the launching platform, about 60 feet northwest of the servicing tower. The size and location of this building suggest that it may serve as a covered entryway for a stairway leading below the surface of the launching platform. A low wire fence, probably for personnel safety, is set in 15 feet from the outer edge of the launching platform, and runs parallel to it along the three sides which overhang the pit.

Servicing Tower

Previous reports portrayed the servicing tower as being essentially square, [] with lattice framework extending the full height, and supported on all four corners and two sides by angled struts. Examination of improved quality photography has resulted in a number of changes in the analysis of the tower. The tower is only 60 feet high, and consists of three major components: a tower base section, an upper extension con-

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sisting of a circular collar supported by four lightweight struts, and a group of eight angled supporting struts.

The tower base section consists of two parallel inner sides, about 16 feet wide and 40 feet high and about [] These are positioned on the north and south sides of the tower, with the east-west opening between them generally unobstructed. The top of the tower base section is nearly square and is visible only on 1957 photography of the tower. The surface of this area is indistinct, and may consist of a temporary cover over an aperture sufficiently wide to enclose the missile. The outer sides of the tower base cannot be seen but probably taper outward to a base width of [] sufficient to straddle the gantry tracks. Shadows on the 1959 photography of the tower indicate that a pair of possible working-level platforms is hinged to the sides of the tower base section at a point about [] above the surface of the launching platform. At the time of the photography these platforms were angled upward, about 45 degrees above the horizontal.

The upper extension, clearly visible on the 1959 photography, consists of a circular ring or collar whose inside diameter measures between [] supported by four vertical members which describe a semi-circle around the east side of the collar. The collar, 60 feet above the surface of the launching platform, is the highest part of the servicing tower.

The eight supporting struts are positioned on two sides and all four corners of the tower, two each on the north and south sides and one on each corner. Each corner strut has three converging members, which angle sharply near the point where they intersect the tower. All eight struts are attached to the tower at the top of the tower base section, about 40 feet above the surface of the launching platform. The bases of the struts are outside the [] circular hole, [] from the center of the tower.

Unidentified Devices

The 110-foot masts identified in previous reports as "probable colli-

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mation towers" have been re-examined, and it is now felt that their function cannot be determined. There are numerous inconsistencies in the identification of these masts as collimation towers. First, masts 110 feet high would be extremely unsteady even if guyed. Use of ground-mounted theodolites for collimation would be far simpler and would provide more accurate alignment of the missile. Second, it would not appear necessary to provide two collimation devices, when a single one would suffice. (The tower previously called a "possible third collimation tower" 400 feet west of the servicing tower probably supports floodlights.)

Another possible function, that these taller masts also support floodlights, appears equally unsound, for several reasons. First, the northeast corner of the launching platform has been purposely extended to allow the placement of one of the masts. Second, the masts seem unnecessarily high to provide adequate illumination. Third, it is probably more than coincidental that the masts are positioned precisely equidistant from the center of the launching platform. Furthermore, a line drawn between the two masts passes through the center of the servicing tower; a projection of this line passes through the center of the interferometer, nearly a mile away.

In the absence of concrete evidence to support either of these hypotheses, no positive identification of these devices can be made.

Probable Liquid Propellant Handling Shed

Remeasurement of this shed indicates that it is

Cascade Facility

Remeasurement of this facility, previously qualified by "probable," indicates that its dimensions are

Possible Umbilical Mast

A shadow, appearing only on the 1959 photograph of the launching structure, extends through the center of the shadow of the servicing tower

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and terminates in an oblong loop. This shadow may be that of an umbilical mast similar to that used with the Atlas ICBM. The mast itself is not visible, since its base is located somewhere within the darkened circular area. Its height may then be anywhere between 85 and 95 feet above the launching platform, depending on its placement.

MISSILE CONFIGURATION AND METHOD OF OPERATION

Based on the foregoing analysis, a number of hypotheses can be advanced concerning a feasible method of operation at the launching structure, as well as some characteristics of the missiles and space vehicles fired at Launch Area "A".

Missile Configuration

The servicing tower and associated facilities on the launching platform provide several indices of missile configuration. The width of the tower base section limits the diameter of the missile to about [] at the level of the launching platform, depending on the amount of working space required. The inner diameter of the collar 60 feet above the platform restricts the diameter of the missile at that height to [] although it does not limit the height of the missile. The possible umbilical mast, which may be as much as 95 feet above the servicing platform, provides some indication of missile height, although the point on the missile airframe at which umbilical connections might be made cannot be determined.

Level of Launch

The configuration of the launching structure provides no conclusive evidence concerning the level at which the missile is erected and launched. A number of characteristics of the structure suggest that it might be equally feasible to launch the missile either from the surface of the launch-

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ing platform or from below it. The photographic evidence for each hypothesis is presented below.

Surface Launch. The support equipment present at the level of the surface of the launching platform is an indicator, although by no means a conclusive one, of surface launch. Both the cascade facility and the propellant shed are located at the surface of the launching platform. The fact that so much of the logistical support equipment is apparently rail-borne suggests a far simpler engineering problem in handling the items brought in by rail, particularly the missile itself, if the missile is erected and serviced at or near the surface of the platform rather than below it. In addition, the great depth of the pit and the large number of observation stations surrounding the launching structure indicate a capability for static firings of large rocket engines as well as actual missile launchings. Such static firings would probably be conducted at or near the surface of the launching platform, to permit maximum observation of exhaust-flame characteristics.

To conduct static firings from the platform surface and actual launchings from below the surface would necessitate removable facilities at the lower level and would also require a duplication of a number of facilities, particularly fuel and electrical connections.

Subsurface Launch. Two prominent features on the launching structure provide some indication that the missile may be fired from a launch point somewhere below the surface of the launching platform. First, the cable conduit/passageway which was added between the 1957 and 1959 photography connects the control bunker with a point about [] below the surface of the launching platform. Second, although the open top of the servicing tower suggests that the missile may extend above it, the relatively low height of the tower suggests that the missile may be lowered somewhat below the surface of the launching platform to allow working levels on the tower at or near the height of the missile nose.

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Method of Operation

A feasible method of operation at the launching structure can be inferred from the foregoing data. The missile arrives at the launch structure by rail, fully assembled and resting on a flatcar which may have an integral erection capability. The missile is transported tailfirst on the center track, which passes between the two gantry tracks.

The west side of the servicing tower is opened, and the missile is then erected within the tower, either on a launch table at the surface of the launching platform or, after being lowered, on a launch table directly beneath the tower. If the missile is erected at surface level, the boom on the rail car could support servicing platforms for work at levels higher than the top of the servicing tower, in a manner similar to that employed by the Soviets on missiles developed from German V-2 concepts.

After servicing of the missile, the rail car and servicing tower are moved away to the west, along their respective rail tracks. To accomplish this maneuver, the tower would be closed on the west side and opened on the east side. It would also be necessary to remove or disconnect the supporting struts on the north side (and undoubtedly also on the south side) of the servicing tower, since the small building northwest of the tower would obstruct movement of the tower if the angled supporting struts remained in place.

CONCLUSIONS

1. The missile or space vehicle fired from Launch Area "A" is limited in diameter to about or less, depending on the working space required around it.
2. No determination of missile height or launch position relative to the surface of the launching platform can be made. The height of the servicing tower places no restriction on the height of the missile.

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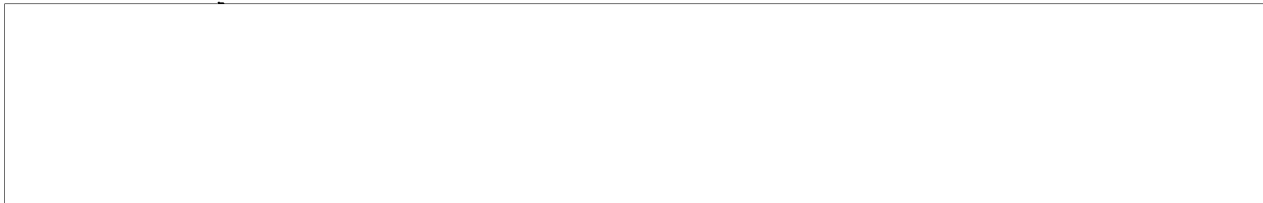
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CHART

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scale 1:200,000 (S)

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